Small
Business
Innovation
Research

Applications of Thin Polyimide Films to X-ray Optics

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INNOVATION

Fabrication processes have been developed for ultra-thin freestanding polyimide films. The films are optimized to provide robust x-ray filter substrates.

ACCOMPLISHMENTS

- Freestanding polyimide films can be made from 500Å to 40,000Å thick with great (±5%) film uniformity.
- Polyimide films are readily metalized to provide x-ray filter transmission in the bandpass range of choice from soft x-ray to EUV.
- Polyimide films' optical and mechanical properties are characterized such that films may be designed for specific pressure and transmission applications.
- Polyimide films only 2500Å thick hold one atmosphere of pressure.

Freestanding Polyimide and Metalized Polyimide Filters

COMMERCIALIZATION

- Nearly spherical 2.75mm gas-filled targets (gasbags) that inflate to hold 16 psi of pressure for inertial confinement fusion research total sales of $0.5M since 1995.
- Laser target entrance windows that hold pressure used by the National Ignition Facility are estimated to reach $0.6M annually within 5-6 years.
- Neutral density filters for the infrared supported on thin polyimide films have been supplied to the National Institute for Standards and Technology (NIST) for sale as the reference standard. The market is estimated to be $0.6M annually.
- A cooperative agreement is being developed to supply detector windows to a scanning electron microscope manufacturer.

GOVERNMENT SCIENCE/APPLICATIONS

- Fifteen different spacecraft astronomy missions have procured aluminized polyimide filters, including two AXAF instruments and the ASTRO-E X-Ray Spectrometer.
- A 1997 NASA SBIR supported additional research into optimization of polyimide films for operation at cryogenic temperature. Feasibility of fabricating sub-micron polyimide film to increase its strength at cryogenic temperatures was demonstrated.

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